

SUMMARY

During the past years introduction of high strength oxide based all-ceramic system made metal free ceramic restorations a popular aesthetic alternative in anterior and posterior region of the mouth. One of the materials is the Procera[®] AllCeramic densely sintered alumina [Nobel Biocare AB, Goteborg, Sweden]. All the studies regarding the very quality of restorative material such as strength, biocompatibility, aesthetics and fit have been done. Long-term survival qualities of the materials are partially related to the marginal adaptation of the crown to the margins of the crown preparations. *In vitro* studies need to confirm such quality of the Procera[®] AllCeram crown coping.

Aims of the studies

One of the aim of the thesis was to investigate the mean absolute marginal fit of Procera[®] AllCeramic [densely sintered alumina] copings. The second aim of the study was to investigate the whether vertical marginal fit of Procera[®] AllCeram copings can be influenced by the tooth groups [incisors, molars]. The additional aim was to investigate the marginal gap value differences depending upon their location within the tooth. The final aim of the study was to investigate whether the cementing media can influence the mean absolute marginal adaptation of the Procera[®] AllCeram copings.

Materials and methods

In this *in vitro* study investigated the Procera[®] densely sintered alumina coping's vertical marginal fit with chamfer finishing line. Two incisors and two molars typodont teeth were prepared for all-ceramic crown according to manufacturers instructions. 0.8 mm width of chamfer finish line was prepared. These four individual teeth were duplicated nine times [9] to obtain total 36 die models. 36 Procera[®] AllCeramic 0.6 mm coping were fixed, first group [AZ] using zinc phosphate cement [Adhesor[®]] $n = 12$, second group with glass ionomer cement [Kavitan[®] Cem] $n = 12$, and third group dual cured cement [Dual[®] Cement] $n = 12$. Marginal adaptation was measured using direct scanning electron microscopy [SEM] on all four axial walls with 4 measurements on each wall with total of 16 measurements per tooth. The influence of between coping factors [luting cement] and

within-coping factor [tooth group and axial surface] on the marginal adaptation of the Procera® AllCeram crown copings is assessed.

Results

The mean absolute marginal adaptation value of groups are AG I [n = 6] 37.9 µm, AG M [n = 6] 27 µm, AR I [n = 6] 44 µm, AR M [n = 6] 50 µm, AZ I [n = 6] 59 µm, AZ M [n = 6] 48 µm. There was no statistically significant difference in mean absolute marginal discrepancy between tooth group, and all mean marginal adaptation values were within the acceptable limit of 100 µm. The Kruskal-Wallis test indicated significant difference between groups [$p < 0.05$]. Within the axial surface marginal adaptation gaps comparison revealed that incisors had wide gap on mid-buccal surface [85.4 µm ± 31.5] and mid-lingual [60.8µm ±36], but molars had mid-lingual [59.8 µm ±10] and mid-distal [57.3 µm ± 13] respectively. The median absolute marginal gaps of study groups were compared for significance. AG group had low mean gap [32.5 µm ±12] and high gap was with AZ group [53 µm ±12]. There were significant difference between the luting agent, AR V/s AG and AG V/s AZ except AR V/s AG group.

Conclusions

Absolute marginal discrepancy measurement dimensions of Procera® AllCeram copings of incisors and molars demonstrated the clinical acceptable marginal adaptations value of 100 µm. While tooth group variations [incisors and molars] did not affect the adaptations of Procera® AllCeram copings. Buccal and lingual axial surface of incisors and distal and lingual surface of molars showed the wide marginal gap. Considering the individual factors separately, luting agents appeared to be affecting the mean marginal adaptation. The absolute marginal discrepancies were recorded in ascending order, AZ group - 53 µm; AR group – 44.5 µm; AG group - 29 µm.